WIRE & WIRE PRODUCTS

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By Herman A. Holz

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By Charles F. Pemberton

Varieties of Wire Pointers
By J. A. Lavigne

Review of Recent Patents

News

December 1926

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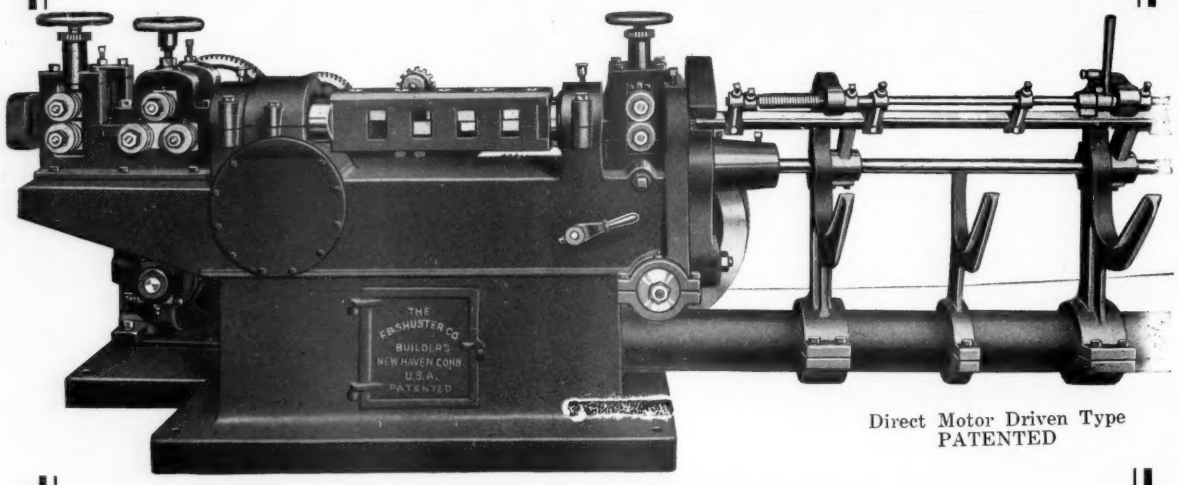

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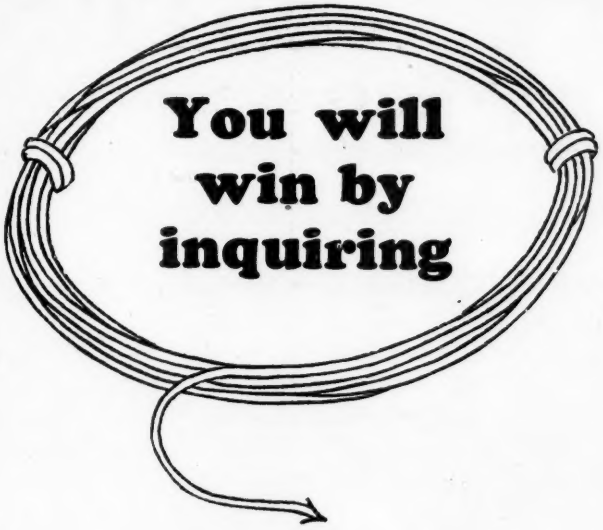

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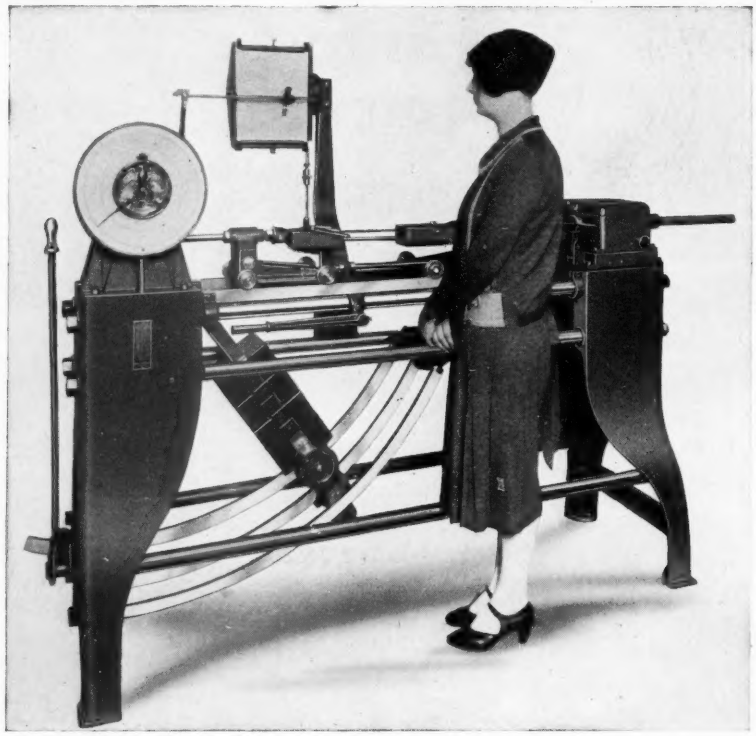

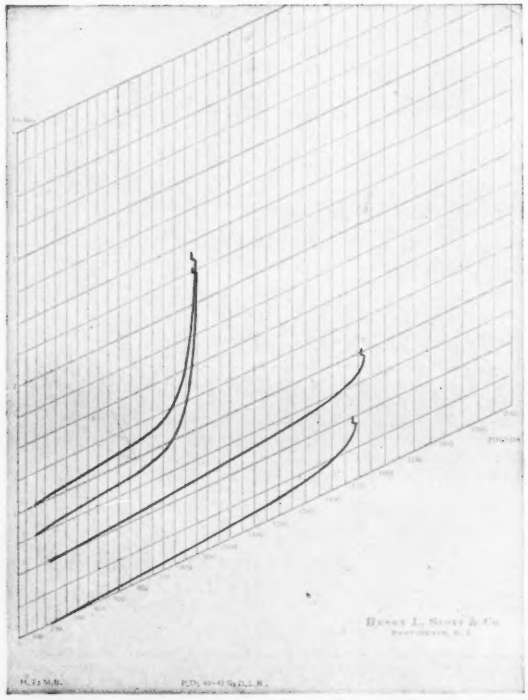

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WITH all due regard to the elevated and buinesslike function of a trade journal, we dedicate this issue of Wire & Wire Products to the more homely spirit of the Christmas holiday.

Unfortunately neither the nature of the magazine nor our earnest Editor's temperament permit much of the gay Yuletide atmosphere to liven the rest of this issue, but in this column at least we shall recline in holiday ease and engage in pleasant—if inconsequential—soliloquy.

* * *

Therefore those who have other concerns than reading our seasonal small-talk had best turn promptly to any one of the variety of interesting articles elsewhere in this issue. Here, let us warn all those who have read so far, they shall find nothing but reasons why our Christmas will be merry.

* * *

A timely compliment comes from an appreciative French correspondent, whose letter reads in part: "I read your journal with great interest; *ca va sans dire.* But what I like especially is its appearance. Every month I turn its pages with much pleasure and enjoy in addition to its contents, its tasteful form."

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* * *

Speaking of style in trade journals, America is notably in the lead in this respect. We look to Europe for many if not all our styles in clothing but in the publishing of periodicals, particularly of a technical variety, Europe may profitably look to our side of the Atlantic.

* * *

It is to be feared however that if we ramble on we shall use up our column and fail in our real purpose which is to extend to all our friends the season's greetings.

The Publishers.

WIRE & WIRE PRODUCTS

A monthly publication devoted to wire drawing and wire forming

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WIRE
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Vol. I DECEMBER, 1926 No. 8

Mechanical Testing of Wire

The characteristics of wire under various mechanical tests

By Herman A. Holz
New York City

THE mechanical properties of wires are influenced by their chemical composition, by the degree of cold working and

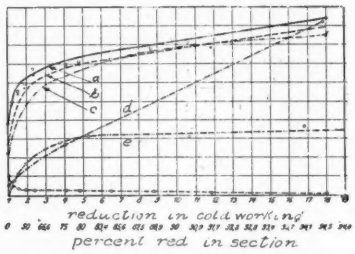


Fig. 1—Effect of cold drawing on (a.) tensile strength; (b.) yield point; (c.) hardness; (d.) degree of deformation; (e.) solubility; the lowest horizontal curve indicates elongation percent.

heat treatment, and by chemical treatment (such as pickling) which they have undergone in the manufacturing processes. Since the number of variables with which we thus have to figure is very large and since it is essential that the quality of the final product be maintained at the highest possible level, strict control of the physical, particularly of the mechanical properties of wires is absolutely necessary.

Let us consider first the mechanical properties of wires which are of particular interest:

1. strength properties
   a. static tensile strength
   b. impact tensile strength
   c. shearing strength
   d. torsional strength
   e. strength under the application of repeated stresses (fatigue strength)
2. elastic properties (elastic limit and modulus of elasticity)
3. plastic properties (yield point, elongation, reduction of area)
4. special properties
   a. resistance to abrasion ("wear")
   b. resistance to repeated bending beyond the yield point (ductility, absence of brittleness)
   c. resistance to repeated heating (in heating elements)
   d. springiness or definite temper degree

The property usually called "hardness" can be brought out in wires much better by repeated, reversed bending tests than by indentations. There are innumerable cases in practical application of wires where the material must possess other special properties, particularly if intended for use in springs. On the other hand, in many cases the efficiency of the final product made from wire depends also largely upon its design and construction; this is particularly true of springs and cables. For instance, a spring consisting of a straight bar in torsion is capable of storing about five times as much energy as a helical spring in torsion, and fourteen times as much energy as when used as a beam supported at each end and loaded in the centre, although the material used in all three springs possesses identical physical properties.

The influence of treatment (mechanical and thermal) of metals on their mechanical properties has been systemati-

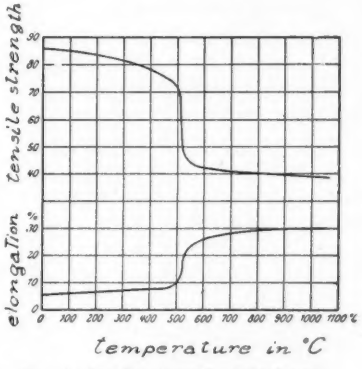


Fig. 2—Tensile strength and elongation of cold drawn iron wire as influenced by annealing temperatures.

cally investigated by many metallurgists, and some of the

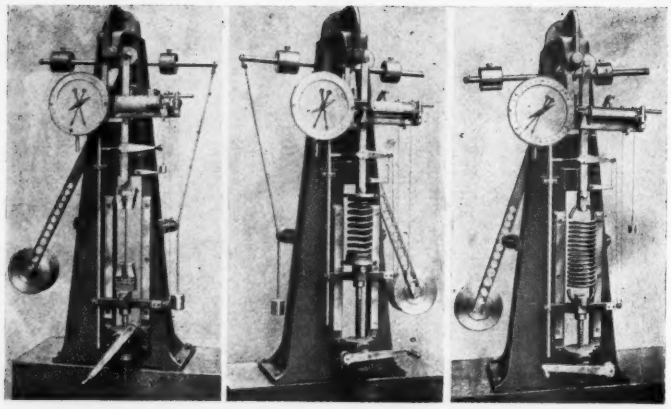


Fig. 6—Tensile and compression testing machine for wires. (a.) Tensile test of wire (b) Compression test of helical spring (c.) Tensile test of helical spring.

data obtained, as far as they relate to wire, since they show the many variables involved and the great difficulties that confront us in a combination of cold working and heat treatment of metals.

First of all, we have to consider the variations in physical properties due to the "forced" deformation of the material while being drawn through the dies. Fig. 1 shows the effect of cold drawing .1% C steel into wire, according to Altpeter.

He took as abscissa the unit F_0/F, where F_0 represents the original cross section of the rod and F the cross section as reduced by successive drawing. For the purpose of comparison, the percentual reduction of section $\frac{F_0 - F}{F_0} \times 100$ is also given; it represents the measure of deformation. The initial diameter of the rod was 13.85 mm, that of the ultimate wire 3.35 mm. The change in grain form, determined by measuring the ratio between the length and cross-section of the crystals, is a valuable aid in such investigations; this ratio naturally increases with greater reduction of the wire diameter.

The solubility (lack of resistance to chemical attack, measured by exposure for 83 hours to a 1% sulphuric acid solution and the resulting loss of weight), the hardness, the ultimate tensile strength and yield point rise with increased reduction of section in a parabolic proportion; the elongation drops rapidly. The proportional and elastic limits change similarly to the yield point. The reduction of area in tensile tests runs parallel with the elongation. Steels containing .55 and .78%C give similar curves. The modulus of elasticity remains almost constant. In a similar way, the electrical conductivity of steel wire is not changed by cold drawing, which is contrary to our experience with other metals, particularly copper. The degree of drawing has a marked influence on some magnetic properties (max. permeability, coercive force) of steel, and it affects the specific gravity of the material in the opposite manner than we would expect: an increase in coldworking reduces the specific gravity of metal sections. This decrease in gravity appears in all metals which have been investigated.

Fig. 2 shows the effect of annealing temperatures on tensile strength and elongation of a cold drawn carbon steel wire,

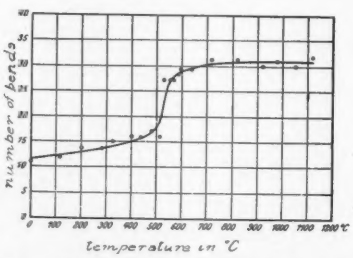


Fig. 4—The influence of annealing temperatures on the resistance of iron wire to repeated reversed bending.

and Fig. 3 demonstrates the effect of both annealing temperatures and annealing period on the same properties. Fig. 4 shows the effect of annealing temperatures on the resistance of a cold drawn wire of the same material to repeated, reversed bending.

In some of the iron alloys we find "critical zones" in the coldworking and heat treatment, and in these critical zones the mechanical properties of the material are far below normal. Fig. 5 shows typical curves of this kind. In this case, the strength properties of the material are reduced most at a 10% reduction. Grain size and elongation are considerably increased, hardness is slightly reduced, reduction of area not much affected, but the static and impact tensile strength, as well as yield point, are reduced quite considerably. It is still an unsolved question whether such critical zones in which the essential properties of coldworked material are far from satisfactory are brought about by heat treatment after cold deformation or whether simultaneous mechanical and thermal treatments would change these conditions.

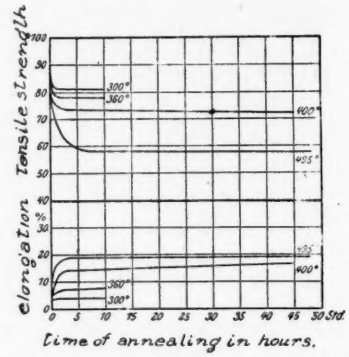


Fig. 3—Effect of annealing temperatures and duration of anneal on tensile strength and elongation of cold drawn iron wire.

At any rate, it will be appreciated that uncertainties in the ultimate properties of wires which may appear even if the greatest care in mechanical, chemical and thermal treatment is taken, require a strict control by systematic testing.

Fig. 6 shows a typical testing

machine for determining the tensile strength of wires, also the tensile and compressive characteristics of helical springs. This machine, used at the U. S. Bureau of Standards, possesses 4 complete ranges of sensitiveness: 0 to 60 lbs., 0 to 200 lbs., 0 to 400 lbs., 0 to 600 lbs. The load dial of this machine is divided uniformly over its entire range. A considerable advantage in testing machines. It is available in full for each of the four selective ranges, the latter being adjusted by simply adding or removing discs at the lower end of the pendulum lever. The inclination of the pendulum lever under load counterbalances the test loads applied during the entire testing operation, so that inertia errors—always present in the horizontal lever type machines—are eliminated. The stress-strain recording apparatus of this machine operates automatically, without any attention on the part of the operator, drawing an accurate stress-strain curve up to the moment of actual fracture of the testpiece. A graduated scale for elongation and compression readings is permanently attached to the machine. For precision tests, a dial extensometer, counterbalanced by means of a special suspension arrangement, may be used to advantage. This ingenious arrangement is shown in Fig. 7 and has become very popular, as it is quite essential for accurate results to relieve the wire specimen of the weight of the extensometer. Similar machines are being constructed in larger capacities.

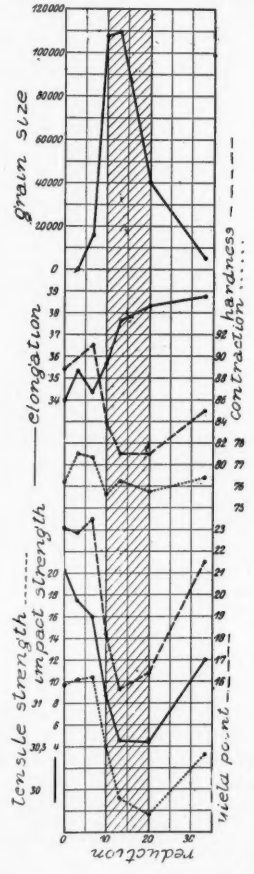
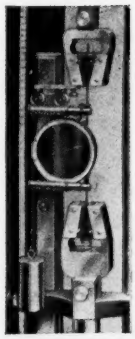


Fig. 5—Critical zones in cold worked and heat treated soft iron.



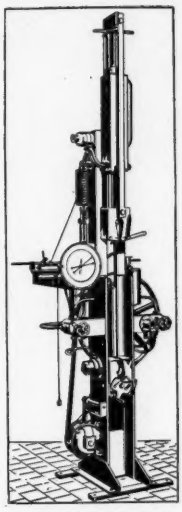


Fig. 7—Dial extensometer for wire testing with counter balance. Fig. 8—Wire testing machine for very rapid tensile tests.

A very interesting wire testing machine is that shown in Fig. 8. It has been specially designed for very rapid testing, each complete tensile test including the stress-strain curve requiring only a few seconds. This machine, constructed in 2000, 4000 and 6000 lbs. capacities, is of hydraulic construction, with all moving parts that may cause inertia errors in high speed testing entirely eliminated.

The ram moves without friction in its cylinder, as no packing of any sort is used. The specimen is placed between wedges open at the front, lifted by a special lever arrangement for rapid insertion of the wires and removal of the fragments. The pressure is produced by a powerful pump attached to the machine and operated by hand or motor. The measurement of the load is effected by means of a loaded piston gauge, the piston being counterbalanced by a heavy spring which is being stressed only very slightly. The load is read on a dial, uniformly divided and calibrated directly in lbs. load. There is no need to slow down the tensile tests in these machines when the elastic limit is reached, as the automatic recorder produces a perfectly accurate stress-strain curve covering the entire test to fracture. A safety valve protects the machine against accidental overloads; a release valve brings the ram back quickly to any desired position.

Hydraulic testing machines, if constructed without packing, diaphragms, or similar elements subject to variations, possess very important advantages over the old-style lever scale testing machines with their knife edges and oscillating beams. Fig. 9 shows, in diagram, the load producing and measuring system of hydraulic testing machines which are now largely used in the U. S.

A_1 and A_2 are hydraulic cylinders, permanently connected by a tube, so that the oil pressure in both is always equal. B_1 and B_2 are pistons, accurately

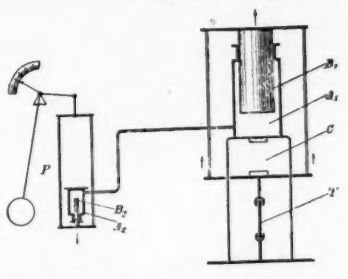


Fig. 9—Load producing and measuring system of a hydraulic testing machine.

ground and lapped and working in the cylinders without packing. These pistons are actuated by the oil pressure which is controlled by a pressure regu-

(*Continued on page 284*)

Varieties of Wire Pointers

A review of divers wire pointers with special reference to recent developments

By J. A. Lavigne
Standard Machine Works, Worcester, Mass.

THE pointing of wire is of extreme importance both as regards the quality of the drawn wire and the life of the dies. The disadvantages arising out of poor pointing methods have been discussed in a previous issue of Wire & Wire Products, and the attention given to this problem, nowadays, by wire drawers and equipment manufacturers is added witness to its importance.

The essential requirement of pointing is the uniform reduction of diameter at the end of the wire coil by some means other than drawing. The wire to be introduced in the drawing die must be uniformly tapering and must retain perfectly the section shape of the original wire. It is essential also that the point fall on the center line of the wire.

These and other requirements make the solution of the problem difficult and have given rise to various types of wire pointers.

Not an uncommon, but outdated form of mechanical pointer is shown in Fig. 1. A set of grooved rollers are mounted in a sturdy frame which is usually bolted onto the drawing bench. The grooves are eccentric to the rolls and the latter are turned back and forth by means of the lever shown. The wire is inserted in a groove and while working the lever, is pushed forward. By continuing this process for a very short time and moving the wire from groove to groove, quite a fine point can be made. Fig. 2 shows a set of these rolls, adapted for operation by means of an eccentric on the main shaft of the wire drawing bench.

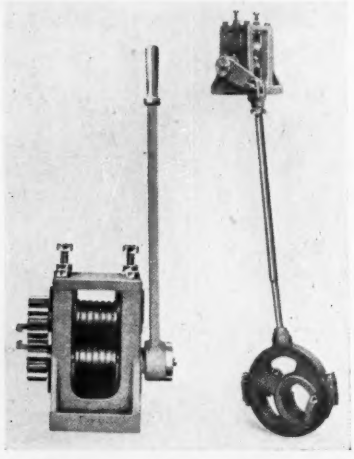


Fig. 1 & 2—A mechanical pointer consisting of a set of grooved rollers. The wire end inserted in the grooves is swaged to a point as the lever is moved back and forth. Tht pointer at right is operated by an eccentric.

Another mechanical pointer, of rather crude type is shown in Fig. 3 and in fact is merely a toggle press provided with special dies for pointing.

A better type of pointer in common use in British plants is the swaging machine. (See Fig. 4 and 5). The machine is driven by an electric motor and the mechanism is contained in a cast iron casing. Inside the circular casing there is a set of rollers in a cage. Through the center of the machine there runs a hollow spindle driven by the gearing behind. In a slot in the enlarged front end of this spindle two rectangular dies are placed and outside the dies two hammer blocks are provided.

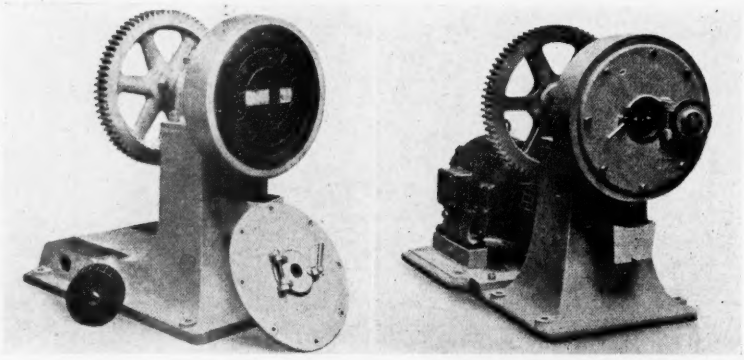


Fig. 4 & 5—A centrifugal swaging machine designed for pointing wire rod. Its operation depends on a set of special dies which are hammered on all sides by a set of hammer blocks. The wire passes through the axis of the machine.

The spindle is rotated at about 300 revolutions per minute and in consequence the hammer blocks are thrown out by centrifugal force. As they pass the roller, however, they are forced in again and give the dies sharp blows. Since the rollers rotate at a speed different from that of the spindle the dies strike the rod inserted between them at different points all around. The rod is thus swaged to a smooth surface and to a shape which corresponds to the form of the dies.

A pointing device of the type illustrated in Fig 6 is in considerable use. This is a gas, pointing furnace and the particular one shown is of British make. It consists of a small gas heated furnace through which the end of the wire is passed. On one side of the furnace the wire is clamped in a pair of fixed jaws while the wire end protruding on the other side is gripped by a pair of tongs attached to the lever. The portion of the wire

inside the furnace is brought to a bright red heat, and the softened wire is then pulled apart by the hand lever.

The Electric Pointer.

Similar in principle to the gas-furnace pointer described above is the electric pointer which has come into practice in comparatively recent years. One device of this type is shown in Fig. 7, with its cover removed to expose the interior. Essentially it consists of an electric heating means and electric motor driven mechanism for pulling the heated rod apart.

The rod to be pointed is clamped in a set of hardened tool-steel gripping jaws. One pair of these clamps is fixed to the frame of the pointer while the other is mounted on movable blocks through which a large lead screw passes. A train of spur gears connects this screw with the electric motor which through means of this train can exert a tremendous pull on the rod.

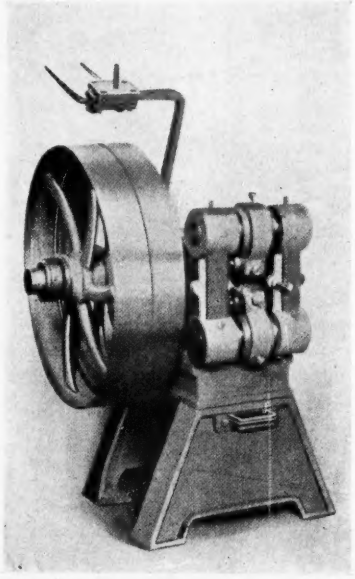


Fig. 3—A mechanical wire pointer consisting of a toggle press provided with dies for pointing.

The motor is controlled by a reversing switch of the drum type seen at the left of the machine in Fig. 7. In addition a pair of safety stops are provided whereby the motor is

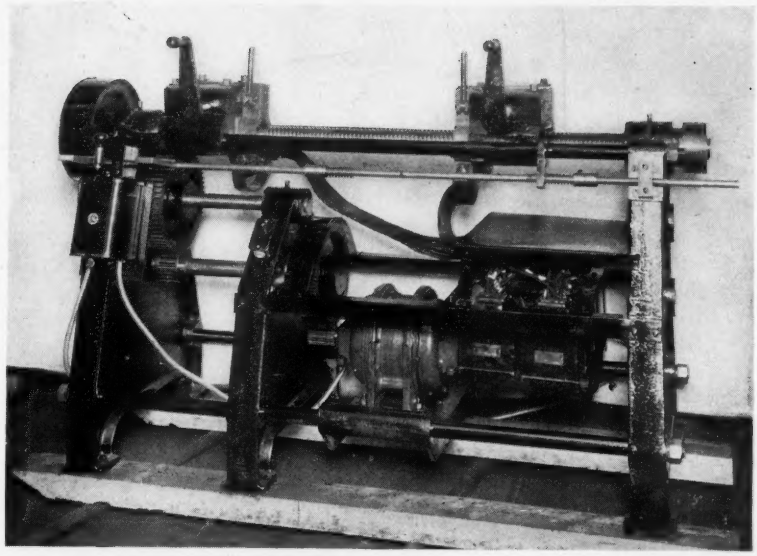


Fig. 7—An electric pointer of recent design. The cover has been removed to expose the interior. The rod is heated by electric current supplied through a step-down transformer and it is pulled apart by motor driven gripping jaws.

stopped if the movable clamp reaches the ends of the screw. In operation an arm attached to the clamp engages a collar on a horizontal rod which draws the drum switch into the "Off" position.

In line with each gripping clamp is an electric contact clamp which makes connection with the rod at the same time that the latter is inserted in the gripping jaws As seen in the illustration a pair of heavy electric cables lead to these contacts from a step down transformer mounted alongside of the motor.

This type of pointer operates at 110, 220, 440 or 550 volts single phase 60 cycle current. Due to the very heavy currents passing through the transformer it cannot be controlled by the usual open switch. The switch controlling the transformer circuit is therefore completely enclosed and mounted at the rear of the machine. It is operated by an electro-magnet which is in turn actuated by an auxiliary circuit and controlled by a push button at the front.

In operation, the movable jaw is set to its proper position and the rod to be pointed is inserted into the contact clips and the gripping jaws. The contact clips are closed by the cam levers and the gripping jaws by the large handles. Then the electric current is passed through the rod by pressing the "start" button. This causes the portion of the rod between the contact clips, to be heated, and when in the judgment of the operator it has reached the proper temperature, the "stop" button is pushed which cuts off the flow of current through the rod. Immediately after the drum switch for the motor is thrown into the start position, the screw beginning to rotate, causes the clamps to stretch the hot rod. When the rod is pulled apart the motor is stopped.

Soft steel Rods of ¾ inch diameter have been pointed by this method.

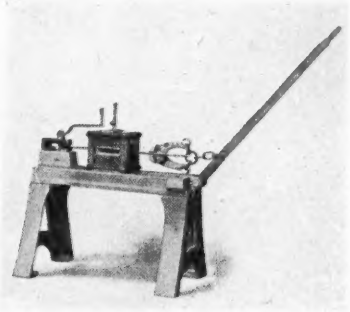
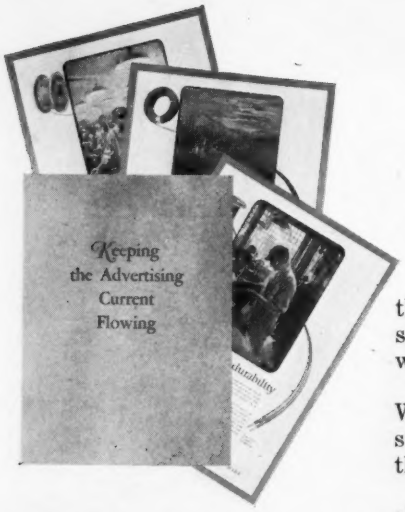


Fig. 6—A thermal pointer of the gas furnace type. Wire passes through a small gas furnace wherein it is heated and then pulled apart by means of the long lever.

How Large Merchandises

Unusual Institutional Advertising

By Charles F.



THE Rome Wire Company, of Rome, N. Y., is completing the first year of an unusual and interesting campaign of institutional advertising which has helped to build prestige for the company and for the wire products which it manufactures.

A series of striking inserts has been used in electrical, trade and industrial publications, in which the use of color and a strongly imaginative treatment have combined to lend interest to a line of materials which might otherwise be regarded as lacking in individuality. Along with the institutional copy there has been a sufficient amount of product advertising to give distributors and users a new slant on the possibilities of building quality into wire products.

Not only has the campaign itself been of outstanding originality and interest, but it has been merchandised to the trade in a very effective way. Jobbers, dealers and salesmen have been kept posted as to the advertising which was appearing, the fields covered have been brought to their attention by analyses of the publications carrying the advertising, and the circulations of the mediums have been compared with the total numbers of buyers to show the complete and effective coverage which has been obtained.

By this carefully worked out plan of merchandising, the company has been able to cash in to the fullest extent on the impressive line of insert advertising which has been appearing.

The following from the Rome Wire Company gives a brief statement of the campaign and the plan back of it:

"It is our belief that considerable good will toward the Rome Wire Company has been spread through the electrical industry and users of electrical wires by consistently strong advertising carried in trade magazines this year by this company.

"Subjects that have heretofore been considered as dead, inanimate things have been brought to sparkling life and interest, and made to dominate the usual trade paper advertising by the skillful use of color, clever art work, and convincing copy. The attention this advertising gains is instant, lingering and favorable.

"The object of this campaign has been to build faith in the institution of the Rome Wire Company, and by so doing build faith in the wire products it manufactures. We have reason to believe this goal has been attained.

"This campaign has been directed to reach central stations, railroads, street railways, coal mines, industrials, electrical engineers, electrical dealers and electrical contractors.

"In co-ordination with the trade paper advertising, the company has carried on a very complete direct mail and merchandising campaign, tying up with the general magazine campaign.

"Although the Rome Wire Company has been well represented in the trade magazines in the past, the 1926 campaign has been far superior to any of

Wire Firm Its Campaign

Thoroughly Sold to the Trade

Pemberton

its previous efforts, and no doubt the results have been in proportion to the increased effectiveness."

The inserts have been printed in four colors, and the illustrations are of a high quality, in keeping with the spirit of industrial romance which pervades most of the institutional advertising.

In a typical insert, the caption of which was "Power's highways to industry," the following appeared:

"Throughout the vast network of copper highways which are gradually linking one great electrical generating system with another, Rome bare transmission cables are doing their part to make the great conception of super-power a firm reality.

"Starting in one small mill at the headwaters of the Mohawk, in the days when industry was watching the first great power line thrust its way eastward from Niagara, the Rome Wire Company has kept pace with the electrical industry. Today twenty acres of floor space are devoted to the production of all types of copper wires and cables —from the huge wrist-thick strands that span the power lines to the tiny, hair-like wires that are used in fine precision instruments.

"Rome Service, in the form of ample stocks and competitive prices, is at your disposal, and an opportunity to quote on any of your wire requirements will always be welcome."

On the second page of the insert is shown a complete list of the company's products and their applications, these being presented by means of thumbnail sketches. This page also carries an offer of technical data to engineers and a list of the company's sales office and branches.

The merchandising of the campaign, which was begun at its inception, was opened with a port-folio analyzing the plan of advertising, carrying samples of the inserts in a pocket in the cover, and giving an official statement of just why this advertising had been undertaken.

H. T. Dyett, president of the company, signed the letter addressed to the trade, which was reproduced on the first page of the portfolio. In this letter Mr. Dyett said:

"For twenty years we have been manufacturing and selling copper wires and cables. For five years we have been advertising these products.

"We intend to initiate an advertising program so far superior to, and so much more effective than any wire advertising of which we have been aware, that we are taking this means of telling you about it.

"As you read through this booklet you will realize that we are making a considerable investment in this advertising. At the same time you will see clearly the advantage to you of this effort on our part.

"Like electricity, advertising is a powerful though silent force. Harnessed and applied in the right direction, it can be made to increase sales.

"We have given time and thought to the preparation of this advertising. We ask you to go over the material on these pages carefully and to acquaint yourself fully with our plans. For with your sincere, wholehearted cooperation, we can make it produce the maximum in profits for you and for us."

The portfolio reproduced the publications which were to be used, analyzed the markets which were to be covered, from the standpoints of number of buying units and coverage, discussed the appeals which were

(*Continued on page 282*)

The Setting of Diamond Dies

Recent developments in die setting, especially in connection with round stones

By Morris Simons

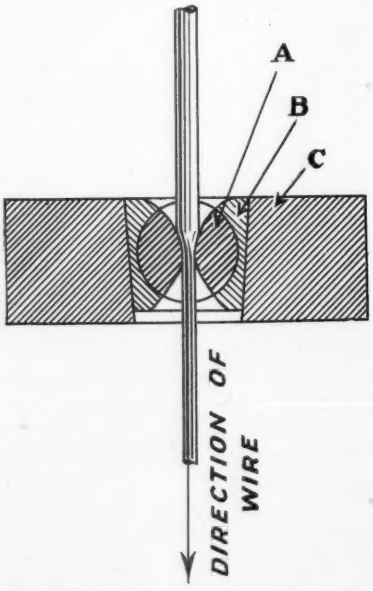
President, Union Wire Die Corp.

FOR over fifty years the drilling and setting of diamond dies has been practically done under the same methods without any change or improvement. The idea conceived by the diamond die drillers was, and in many cases still is, that a diamond being hard, is strong, and therefore can withstand the pressure created by the drawing of wire through it. This would be correct if the diamond in drawing wire, did not at the same time undergo a sort of vibration due to the drawing of the wire. In other words, a diamond can withstand much pressure when it is in a still position, but it is quite a different thing when the diamond vibrates at the same time it is receiving heavy pressure. Any diamond that will withstand a pressure of a few thousand pounds will smash to pieces when it receives the slightest tap of a quarter pound hammer. The elongation of a diamond is zero, and therefore it breaks easily.

Due to the theory conceived in the past that the diamond will withstand vibration as well as pressure due to drawing of wire, one method of setting used was to cast a brass casing around the diamond; another was to cast lead around it, and then hold it in a brass casing, and previous to both of these methods, some diamonds were set in copper. In later years, another method of making diamond dies was developed, and this was to cast the diamond in a hard metal. In any of these methods, the diamond receives a very small support from the casing. In the case of a soft alloy casting, the tensile strength is too low to reinforce the diamond. In the case of a hard metal casting, the oxide that is formed between the diamond and the casing furnishes a soft bed between the diamond and the casting, offering no support to the diamond. In addition, the casing that was made of hard metal tended to burn the diamond to a certain extent, particularly around the bearing, as it requires a high temperature to melt the metal. In all these instances, the diamond was drilled first and set into the casing afterwards.

The article "Round Stone Diamond Dies" in the November issue of WIRE & WIRE PRODUCTS was erroniously attributed to A. Simon. The article was written by Morris Simons.

Recent developments led to a type of setting which is primarily a forged setting. This is accomplished under pressure at the time when the metal is brought to a certain temperature before it is ready to oxidize, and the metal then embraces the diamond all the way around. The diamond is set into a nib first, which is turned down to a taper, and then is pressed into a blank of sufficient strength to reinforce the diamond against breakage due to the combined pressure and vibration created by the drawing of wire. The taper on the nib, as can be seen from the sketch, is in the opposite direction to the front of the die, and therefore, the more pressure that is exerted by the pulling of the wire, the more pressure will be exerted by the outer blank on the inner nib. Both the inner nib and the outer blank are made of a non-corrosive, and at the same time, high tensile-strength metal, so that the die blanks will not rust. Due to the method of setting, the metal that surrounds the diamond itself comes in direct contact with the diamond without forming any oxide between the diamond and the metal, and therefore the diamond receives the full support of the nib as well as of the blank.



Sectional view of a round stone diamond die setting designed to resist drawing strains and the effects of vibration. A, diamond; B, nib; C, outer blank.

Because only round diamonds are used, it is possible to drill them only after they are set in the nib. Therefore there is no burning of the diamond after it is drilled.

Comparative tests on the same quality and size of diamond, having the same workmanship, but in a variety of settings show that the type of setting here discussed gives the die over 40% longer life than the die made with the ordinary setting.

Development of Needle Making

A concise treatment of the essentials of needle making

By E. R. Miner

THE sewing needle was first manufactured in Spain. They were made entirely by hand and the operations held as a trade secret of great value. Eventually a Spanish negro carried the secret to England in 1545. At his death the business vanished and the art was not recovered until 1650 when new methods were worked out by Christopher Greening. The manufacturing establishments settled around Redditch, County of Worcester, in England and practically the world's supply has come from that district ever since. The industry has always supplied both factory and cottage work but the remarkable characteristic has been that, whether in the shop or in the home the workmen performed but a single operation. Each group jealously guarded their small secret of manipulation

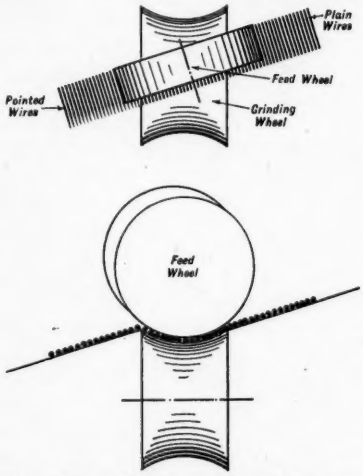


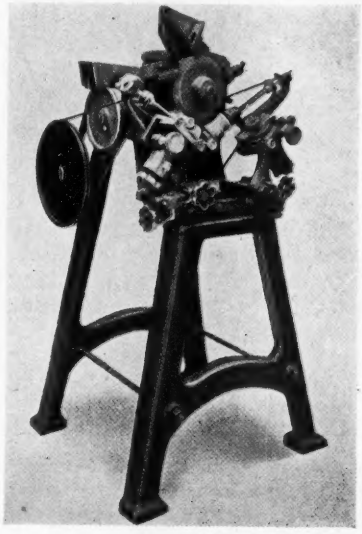
Fig. 1—Essentials of a needle pointing machine. The feed wheel is of India rubber.

and the shops have fostered this notion by having entirely separate rooms for the different classes of workers. There are probably fifty factories around Redditch, the small factories still do much of the work by the old hand methods, the larger shops have put in machines of a sort but there is very little gain in either cost or speed of making. To understand the making of a needle it is necessary to describe both the hand and machine operations because both are used and a good hand operator can very nearly approach the output of the machines.

Few needle makers are wire drawers, the steel used is claimed to be of special composition, heated in small batches and worked to acquire certain qualities of hardness and temper. The metal reaches the needle maker in coils weighing 12 to 14 pounds and about 2 feet in diameter. They are not stacked one on top of another as is common in an American shop but are hung on bars projecting from the walls of the store room. The room is heated by hot air and the claim is made that this heating not only keeps the wire from rusting but that it prevents other changes which would make a difference in the completed needle.

Cutting

The first operation is the cutting of the wires. In the old hand method a pair of large shears were fastened to the wall with blades vertical. The workman laid a coil on a projecting shelf and separated out a handful. Grasping the wires by both hands he brought them between the blades of the shears and by pressing with his body against the handles made his first cut. He continued to grasp the wires in the same manner bringing the cut ends to a stop and in this way cut the wire into lengths of two needles until he had completed the circle of his first handful of wire. The operation was repeated with another handful and so on for coil after coil, this workman performing no other operation and



An automatic head grinding machine for needles.

reaching a dexterity that was a marvel of speed. Large factories have replaced the shears with cutting machines operated by power.

The wire varies in diameter according to the size of the needle to be made, the usual size of needles run from number one of which 22 thicknesses make an inch to Number 12 of which there are 100 to the inch. A number six needle which is the middle size is cut from a coil about two feet in diameter, weighing 13 pounds, measuring one and a quarter mile long and making forty to fifty thousand needles. The wire is gauged for size in several places along its length, the gauge used being a simple flat plate of steel with numbered slits along its edge.

Straightening

After cutting it will be recognized that each piece of wire is curved as a part of a circle

two feet in diameter and of the length of two needles. The next operation is straightening and it is undoubtedly the most peculiar operation of needle making and for at least two hundred and fifty years was kept as a closely guarded secret. The wires are first annealed. The annealer has many iron rings, three, four, and six inches in diameter and one-fourth inch thick. He places two of these rings upright on an iron table and proceeds to pack them with wires laid horizontally. When completed he has many thousand wires in a compact bundle with an iron ring over each end. This bundle is placed in a small furnace and brought to red heat. It is taken out glowing and placed on another iron plate. The annealer picks up a long bar of iron approximately one inch wide and placing it over the needles and between the rings grasps each end and bearing

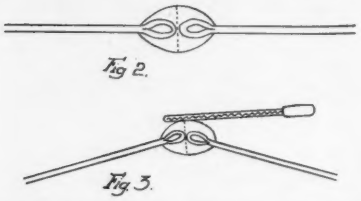
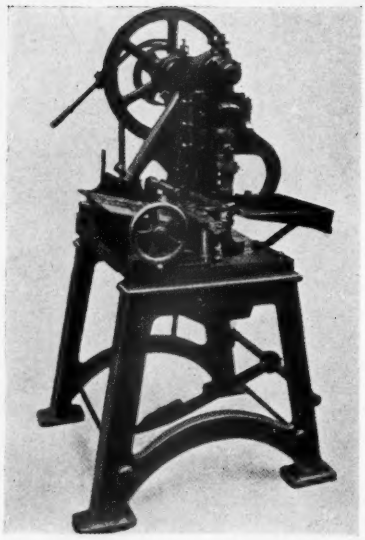


Fig. 2—Shape of needle head after stamping.
Fig. 3—Method of removing burr on head.

down strongly commences to roll the bundle backward and forward. This action causes every piece of wire to roll over and under other pieces of wire so that one wire presses out the convex cavity of another. The heat facilitates the work, the sound is much like that of filing with a medium coarse file. The note changes as the wire becomes straighter until when they have become perfectly straight the workman can distinguish the fact from the pitch or sound.

Many modern improvements and machines have been tried and suggested for performing this first straightening. It is doubtful if any of them are used over a short trial period as this old hand method handles many thousand wires at one time, does the work perfectly and the workmen become so skillful



An automatic eyeing machine made in England.

that they will handle one bundle after another in rapid succession.

Pointing

Pointing is the next operation. The modern mill performs this in two operations, the first is called tapering, the second fine pointing and this last is reserved for a final operation after the needle is hardened and tempered. The tapering is done by machine on a concave grinding stone (Figure 1) approximately 2″ in diameter and running at 2,000 R. P. M. It is topped by an india rubber feed drum which carries the needles in a steady stream across the stone, the rubber giving just the proper pressure and at same time allowing the needle to rotate on its own axis. It can readily be seen that the convex surface of the stone will give a long taper to the points while the speed of the stone requires but an instant to produce the required result. The workman stands over the stone and continually fettles (trues it up) with a steel tool held in one hand while he feeds the wires with the other. The metal dust is carried away by an exhaust system which provides a hood over each stone. The operation is easily understood by reference to Fig. 1. C is the grinding stone, D the rubber feeding drum, E the feed trough, F the receiving trough for the tapered wires.

After being tapered on both ends the wires are ground in the middle on an emery wheel. This is called skimming and removes the hard skin on surface of the wires saving the stamping dies and giving them longer life as well as allowing a sharper impression.

Stamping

From the skimming operation the wires go to the stamper. In this operation the heads, grooves and gutters are shaped out but no hole is punched. The larger factories now employ a machine working on the principle of a drop hammer with a cam and spring action. The wires are fed at regular rate by falling into transverse grooves in the periphery of a wheel from which they drop into position on the lower die. The stamp operates and the wires are then thrown off by two steel fingers.

Punching

Next the eyes are punched and even the larger factories still use the old hand process to some extent. On the machine that does this work the wires pass in a steady stream along a slide being carried forward at regular intervals by dropping into the threads of two screws. As the wires approach the die they are lined up by a knife edge that passes across the center of the wire between the stamped needle heads. The wires slide to a stop which brings them into place under the die. As the holes are punched a pair of trips rise and lift the wire over the stops where they are caught in a trough leading to box or pan. With the Calyx-eyed needle there are five holes so that the operation of piercing the eyes has to be repeated. To pierce five holes at one time would distort the needle so that three holes are punched on one operation and two holes in another operation. The hole in the center forms the notch while the split is made in the same way that is employed in making the split in steel pens.

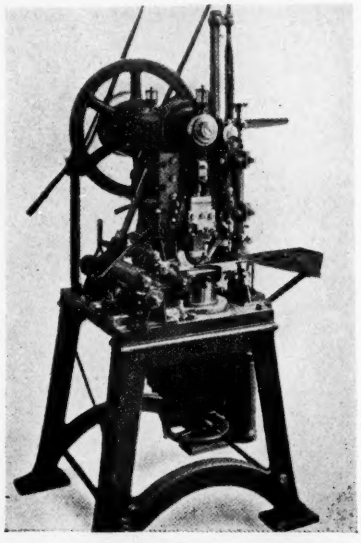
Spitting

After eyeing the needles are threaded on pieces of wire 6″ to 7″ long. This is called spitting and is performed by boys. Holding two pieces of wire in the hand at a proper distance these boys thread the needles so that the two wires pass through the two eyes at the same time. The dexterity these boys acquire and the speed at which they thread these double needles on two wires is most remarkable.

Filing

From the spitter the needles which now form a double pointed comb are passed to the filer who clamps them in a special vice (Figure 3) and files away the burrs on both sides. He then unclamps them and holding the comb with both hands breaks it apart at the center by a peculiar waving motion. There are then two separate rows of needles strung on wires, these he again clamps into a vice and files away the square corners and rounds the heads.

There still remains a roughness or burr in the eye of the needle and to remove this the needles are restrung on another wire that has been given a roughened surface. These are hung horizontally from rods over a table that moves backward and forward. The needles following the movement of the table swing back and forth on the wire in such a manner as to give a polishing action. As the movement is kept up for from six to twelve hours the eye and channels are made perfectly smooth and given a high polish.



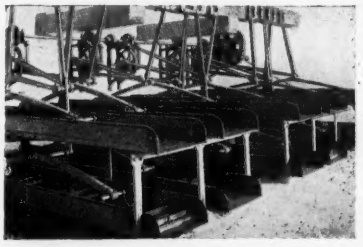
A combined stamping and eyeing and stamping machine of British make.

Tempering

The needles are now hardened and tempered. They are placed in regular layers in shallow iron pans, which are put on a grid in a small furnace. As the needles come to a red heat the operator continually turns and mixes them with a small tool called a knife. In this way every needle is brought to the same temperature. After being sufficiently fired, which is decided by the eye of the operator the needles are removed and immersed in oil. They are then washed in soft soap and water and placed in another furnace on iron plates. The temperature is gradually increased until the needles become red hot after which the temperature is lowered until the needles are cold. During the entire operation of tempering the needles are moved about, piled in layers and repiled with the before mentioned knives.

Scouring

The needles now go to the scourer. Here they are laid horizontally on a heavy strip of canvas, forty to fifty thousand needles to a batch. After coating with soft soap and emery the canvas is tightly wrapped around them and tied, making a roll about two inches high and approximately two feet long. Two of these rolls are placed in each scouring machine. The machine is merely a flat bed on a solid foundation, over which is a heavy cover that can be brought down on top of the rolls of needles with considerable pressure. The rolls being in place this cover top is made to move backward and forward. The needles are pressed down and made to roll and turn on their own axis, each needle rolling over and under needles so that they produce a continuous rubbing action upon each other. After eight hours the rolls are opened the needles washed in suds, placed on new canvas and the operation is repeated. For the best needles this scouring is repeated six or seven times so that the scouring of a single batch or roll of needles requires seven days. Needles have been scoured in this fashion for three hundred or more years and while other methods have been tried none have proven so satisfactory either in results or cost.



Scouring mill for needles.

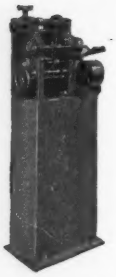
After the final scouring which is done with putty powder (stannic oxide) and the final washing and drying by heat, the needles pass to operators who separate out the broken or bent needles. This is an expert hand operation, needles are spread down from a small pile onto a flat iron surface so that they lie in single order one after the other. A girl passing her hand across the single layer will pick out all the broken and bent ones by the sense of touch and do it so rapidly that the eye is unable to follow all the movements of her fingers. The broken needles are placed into one pan while the bent needles go into another. All bent needles go to the hammer straightener. This is usually a woman or girl. Sitting at a bench with a small flat bed of iron or steel in front of her she spreads out a handful of needles along one side of the plate. Then rapidly moving single needles over the plate with one hand she taps them with a small hammer held in the other. Experience has given her a sense of touch and accuracy that permits her to straighten these bent needles at the rate of four or five thousand per hour.

The needles now go to the header or upender who arranges

(*Continued on page 284*)

Some *of the* Master Tools *of*

UNIVERSAL SPRING



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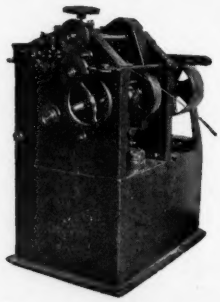

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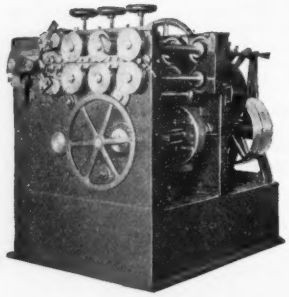

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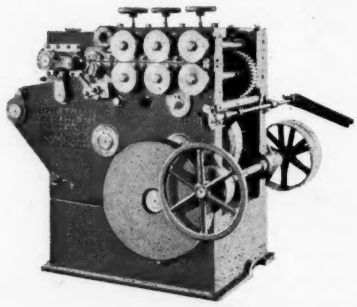

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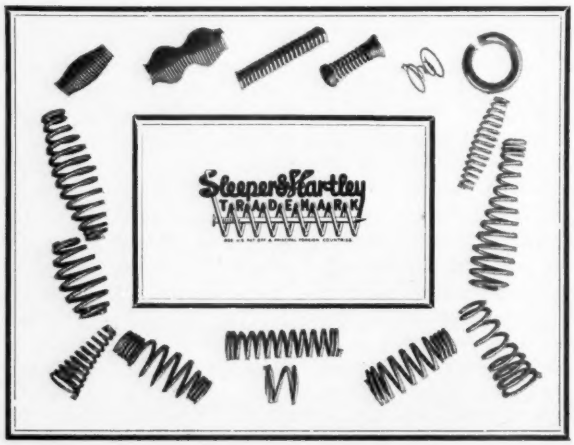

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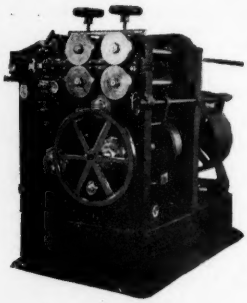

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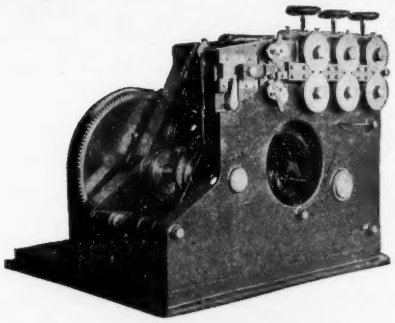

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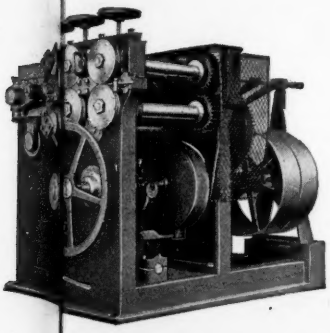

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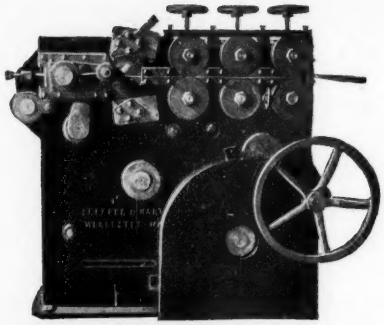

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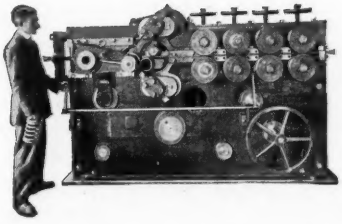

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& HARTLEY, Inc.
RCESTR, MASS.

gners and Builders of
ING AD WIRE-WORKING
MACHNERY

Why Hamper Your Skilled Men with Obsolete Equipment ?

EDITORIAL · IMPRESSIONS

Trial and Error—Mostly Error

"TOO much competition and not enough profit" was the short tale of woe a spring manufacturer recently told us, and we were led to consider the situation a little, in quest of a moral to the tale.

In most quarters the manufacture of springs is a loosely organized process adapted to cope with certain routine requirements. Coiling machines do their jobs well enough and special forming manages to be done somehow; but about all the operations there hangs a mist of vagueness that leaves the estimator groping when he is asked to set a price on a new job.

And the result?—Guesses at costs based on some remote experience; blind bids at prices and pious hopes that the price quoted will meet the competitor's and still yield some profit.

Ultimately, the shrewd buyer, aware of the situation, takes advantage of the general laxity in cost accounting, and initiates a cut-throat competition among his bidders. This unfortunate condition, we are told by our friends in the industry, has been prevalent for some time in the manufacture of springs.

What is needed here is system, and first and foremost standardization. In a plant where the individual operations connected with the making of various springs have not been determined and standardized there can be little hope of accurate computation of manufacturing costs. There must be a standard procedure if the cost of that procedure is to be predicted.

Next, the cost of every operation should be computed on the basis of past experience and if possible, charted. Once a careful study of conditions in any plant is made, it is comparatively easy to estimate the expenditure for labor, for material and for overhead. One spring manufacturer tells us that he has had such system in successful operation for over five years.

But such system needs to be adapted throughout the spring manufacturing industry. Not that we offer the plan as a panacea for all the vicissitudes of the trade, but it is evident that the man who knows just what effect every distinct operation has on his costs, will be likely to make sound estimates and know when his competitors are making losing bids.

Organized Growth

MORE and more the importance of educating the consumer in the use of wire products is being recognized and there is a general tendency to extend the scope of wire usefulness with the aid of advertising.

Nothing, however, has as yet been done in what seems to be the most important step towards the development of the industry at large: organization.

The many common interests of wire manufacturers warrant a trade association and the extraordinary size of the industry would assure such organization of unusual power and influence in American and international industrial relations.

And in view of the special interest of these paragraphs, that is, the extension of the use of wire through development of new wire products, a trade association would be invaluable.

As we go to press we are informed of a new movement toward trade associations undertaken from a different angle. The National Committee on Metals utilization has undertaken the task of correlating the waste elimination programs of the metal-using industries. To this end it seeks the co-operation of the trade associations and plans to organize such associations where they do not already exist.

With a strong, extensive industrial organization immeasurable work can be done towards increased welfare, economy and trade development.

WIRE
& WIRE PRODUCTS

Incentives to Work

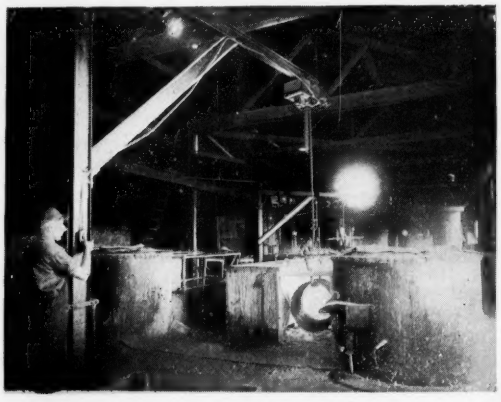
WELFARE work on part of manufacturers — so long discredited by the independent labor unions—is reported declining in this country. The Bureau of Labor Statistics has announced that recreation grounds and employee social organizations maintained at manufacturing plants are rapidly disappearing.

Industrial welfare work is a form of paternalism and that institution has never met with much favor in America. It is not however to be sweepingly condemned, for the intelligent and sympathetic assistance offered to labor by organized welfare departments of plants has done much toward improving conditions of labor and the home life of the worker.

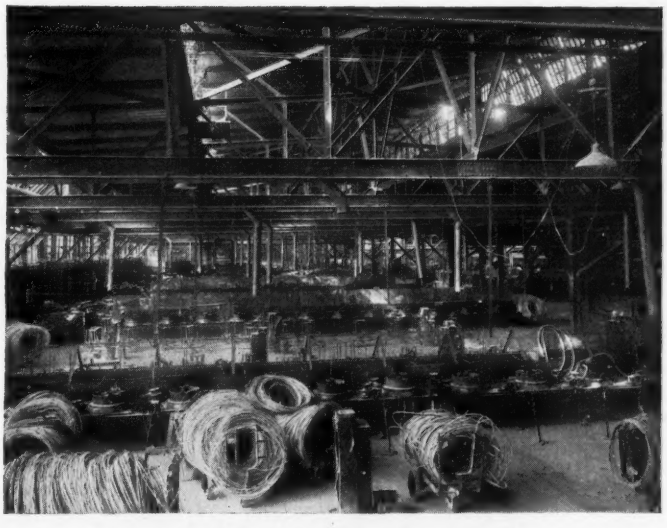
The report of the Bureau of Labor Statistics exposes rather amusing situations in plants which maintained departmental base-ball teams. Not infrequently these factories—like some universities—kept men on their force whose value was largely their ability to play baseball. Personnel work can

VIEWS OF THE WIRE WORLD

At right—A wire mill, rather outdated. Primitive Swedish wire mill in Smaland, the highland district of Southern Sweden. It is near Gnosjoe and is about 300 years old.



At left—A view of the annealing department of the Atlantic Wire Co., Branford, Conn. Salt annealing baths are used.



At right—Wire drawing department of an American Steel & Wire Co., plant. Wire is threaded through the upright levers in front of the blocks. Kinks in the wire will stop the machines as they reach these levers.

By courtesy Bureau of Safety, U. S. Steel Corp.

If you have photographs of interest to the Wire industry, send them to Wire & Wire Products

Modern Wire Rope Manufacture in Germany

By Ernst Trebesius

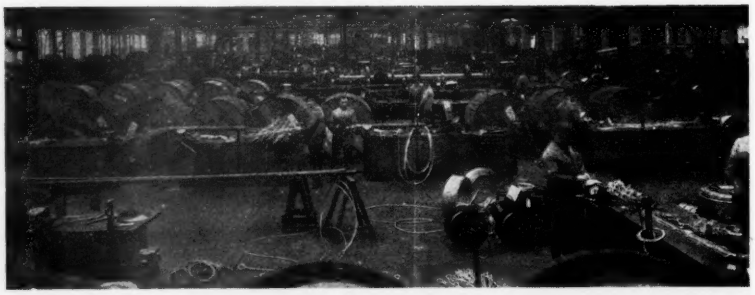
WIRE rope will soon be able to look back on a century of progress. It was in 1831 that Director Albert of Clausthal first introduced it as a substitute for chains in the Hartz Mountain mines. He is also noted as the originator of the idea of plaiting several wires by hand to form a rope. To the hemp rope and chains already in use, came, with the introduction of wire rope, another hauling means, one which has found many applications without detracting from the importance of the other two.

Besides advantages, each of the trio has its drawbacks, which delimit its field of usefulness so that there is little likelihood of one supplanting another.

The first wire ropes differed from hemp ropes in that the wire and strands twisted not in opposite, but in the same direction. Today this method is still in use for certain purposes, but since 1840 it has been replaced by braiding to a greater and greater extent. Even so early, to impart extensibility, wire rope began to be made

Braiding machine of a large German wire rope plant.

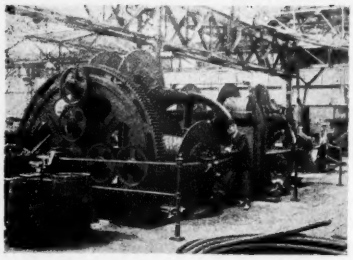
with a core of hemp. The introduction of braiding constituted without any doubt the greatest advance in the wire rope art, as all later processes, however important for certain purposes do not attain the all embracing importance of braiding. With the technique available, in the first decade after its discovery, only iron wire was available for the manufacture of wire rope, a circumstance which answered the purpose fully. Only later, in step with progress in foundry technique and wire-drawing did hardened Bessemer steel wire come into competition with iron wire. Certain wire ropes of this material, an advance over iron wire ropes, will soon be unable to meet certain specific requirements, particularly in mining.



View of a German wire rope plant.

With a tensile strength of from 55 to 65 kg. per square millimeter section, the ratio of weight to tensile strength becomes more unfavorable with increase in the depth of the shaft. In the meantime, in England, where a need arose for wire rope of high tensile strength for its highly developed mining industry, cast steel was applied to rope manufacture and it was brought to light more specially that it had twice or thrice the tensile strength of similar iron wire rope. In Germany, also, researches were undertaken in this direction, and after lengthy and costly labors, a material of such merit was evolved, that mine officials allowed cast steel wire rope to be used on passenger elevators. For the same load, its greater tensile strength permits the weight of the rope to be less, so that such a rope needs to be only from one-half to one-third as thick as a rope made of iron wire. Today, cast steel wire is used, with a tensile strength of from 80 to 250 kg. per square mm., according to the use for which it is destined. Usually with a strength of 120 to 130, or 130 to 140 kg. is worked into a form in which cast steel will unite the greatest ductility and flexibility together with proportionate tensile strength and elasticity, and an elastic limit of from 80 to 85 per cent. Needless to say, elasticity is one of the essentials of a good wire rope.

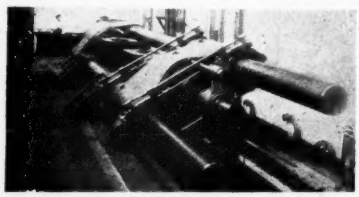
It is one of the weightiest duties of responsible mining authorities, to fix the correct time for this change. This is not always so easy at it apears at first sight. One must distinguish accurately between the number of breaks and the number of broken wires. Very often it happens that one and the same wire in the same piece of rope may be broken at several



An unusually large stranding machine.

points, yet owing to the double braiding of the rope, the wires are squeezed upon one another so closely and there is so much friction, that a broken wire resists removal as strongly as if it were not broken.

The wires are twisted into strands in the stranding machines. Each machine has at one end the braider head, while at the other end is the drive, (usually unit elctric drive). The spools are mounted one behind the other parallel with the driving axle. Each spool is mounted freely on a spindle in a frame which is pivoted at both ends. These frames with the spools inside do not rotate with the machine. The wire from the spools is brought through guide rolls and guides parallel with the axis of the machine to the compression block at the nose and from there on adjusted rollers to the center point where all the wires are formed into a strand. The stranding machines are ar-arranged for left-hand and right-hand rotation, and revolve at from 800 to 1500 revolutions per minute. In one day,



Huge wire rope tensile testing machine.

about 4,000 to 6,000 meters of strand can be formed on one machine. An automatic winder in front of the compression block winds the finished strands on to a larger spool. If the

Translated from Technik für Jedermann, Oct. 21, 1925

Can you answer these questions ?

1. Do you know the most efficient die entrance for a given size wire?
2. Do you know the present status of colors in trade marks?
3. Do you know why piano wire, and high-tensile-strength wire rope are particularly sensitive to weak acids?
4. Do you know the structural causes of diminished plasticity in cold drawn wire?
5. Do you know the recent inventions in wire netting?—in wire insulating machinery?—in coiled springs?

All these are answered in the January issue of

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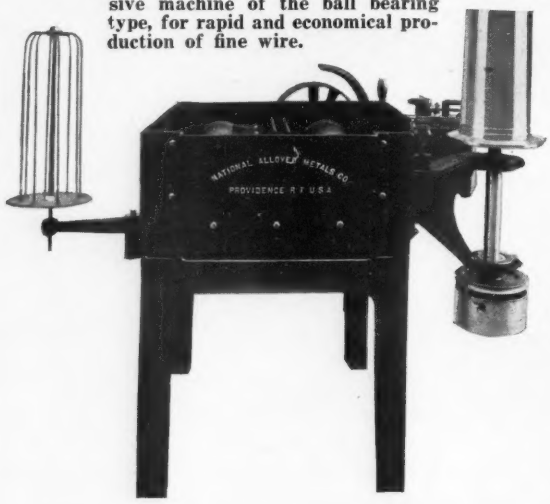

Illustration features No. 2 Machine. Capacity No. .20 B & S to .003.

We will furnish information on other sizes.

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Multiple head spoolers

Draw frames and rolling mills

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NEWS of the INDUSTRY

THE Johnson Steel & Wire Co. has been organized at Worcester, Mass., to manufacture a general line of wire, with high carbon steel wires as a specialty, and will erect a mill, 60 x 200 ft., two stories. It is a Massachusetts corporation, with capital stock of $150,000. The officers are: President and general manager, Charles D. Johnson; vice-president and assistant general manager, George E. Peace; treasurer, Bernard A. Johnson; assistant treasurer, George G. Johnson; clerk, Ernest L. Anderson. The three Johnsons are the sons of the late Charles O. Johnson, who founded the Worcestr Wire Works and conducted the business, with his sons, until his death in 1919. The sons disposed of their interest in the business last summer. Mr. Peace was formerly manager of a steel mill at Hamilton, Ont.

THE STEEL CO. OF CANADA, LTD., Hamilton, Ont., is installing machinery for the manufacture of chain link fencing which will enable the company to supply types and sizes from ⅜-in. to 4-in. mesh, using wire varying from 19 gage to 6 gage, in widths up to 10 ft.

THE Thompson Wire Co., Mildred Avenue, Dorchester, Mass., has filed plans for a one-story addition, 65 x 150 ft., to cost about $45,000 with equipment.

EVAN J. PARKER, formerly of the Morgan Engineering Co., Alliance, Ohio, has joined the Northern Engineering Works, Detroit, in charge of the sales promotion division.

(*Continued on page 278*)

Announcing a Service to Fine Wire Manufacturers

THE most important item in the drawing of wire, the diamond die, can now be sent to this specialist for necessary adjustments and repairs.

We furnish a complete service on diamond dies, being equipped to do regrinding, polishing, shaping or any other of your requirements.

A staff of skilled technicians having many years experience assures you of expert work and a maximum of satisfaction.

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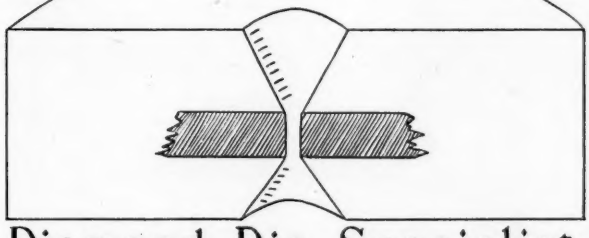
John Leather



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Guaranteed not to mark or swell wire in spots.

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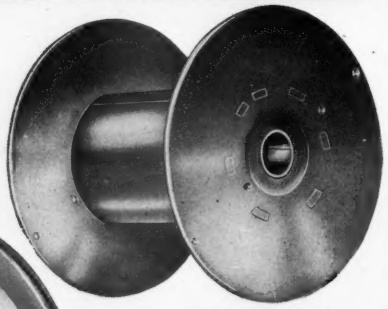

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2051 Grand Central Terminal, NEW YORK CITY
Russell A. Singleton, 713 Slaughter Bldg., DALLAS, TEX.
140 S. Dearborn St., CHICAGO, ILL.
101 Augusta St., GREENVILLE, S. C.

News of the Industry

(*Continued from page 276*)

THE Lingo Metal Works, Wilmington, N. C., has been making inquiries for a quantity of sprockets and conveyor chains.

THE Case Crane & Engineering Co., St. Clair Street and Curtis Avenue, Columbus, Ohio, manufacturer of cranes and hoists, has changed its name to the Case Crane & Kilbourne Jacobs Co.

THE Michigan Wire Fence Co., Adrian, Mich., has discontinued the manufacture of woven wire fence and is offering its fence looms and plant for sale. E E. Tobias is manager.

THE Campbell Wire Specialty Works, South Bend., Ind., maker of wire shapes and operator of automatic wire works, has changed its name and address to the Jeschke Wire Specialty Works, Crawfordsville, Ind.

THE State telephone department of the Egyptian Government, Alexandria, Egypt, is in the market for wire and cables and other telegraph and telephone equipment to cost about $275,000. The American Consulate, Alexandria, William D. Mann, assistant trade commissioner, has information regarding the proposed purchases.

JOHN F. HAZEN, is now connected with the sales department of the Bethlehem Steel Co. The headquarters of the firm are at Bethlehem, Pa. Mr. Hazen will specialize in wire products. He was formerly general manager of sales of the Pittsburgh Steel Co., with which organization he has been associated since 1902. Mr. Hazen has been in the iron and steel business since 1879 and since 1902 has been specializing in the sale of nails and wire products.

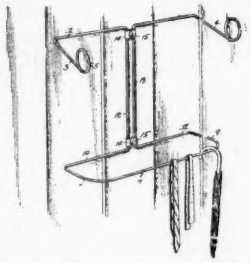
(*Continued on page 280*)

Review of Patents

Conducted by
EUGENE GRUNSTEIN

Hanger for Wardrobes

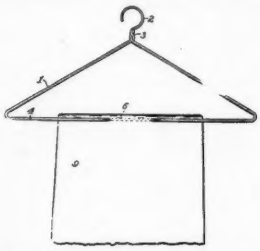
With this ingenious and simple device Mr. Fischer of the Fischer Spring Co., adds another item to the large variety of wire products manufactured by his firm. The present invention is made of one piece of wire designed to be securable to a closet door or the like.



U. S. Patent No. 1,604,400, issued to Charles Fischer, New York, N. Y., October 1926.

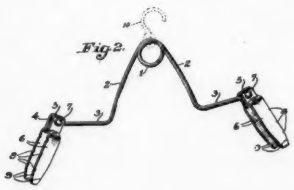
Garment Hangers

An extremely simple hanger consisting of a single wire.

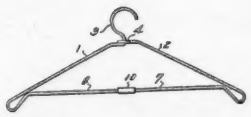


U. S. Patent 1,605,918, issued to T. M. Buchanon, Waterloo, Iowa, November 1926.

A trouser hanger provided with two clips distended by means of springs and designed to keep the legs of trousers taut and unwrinkled.



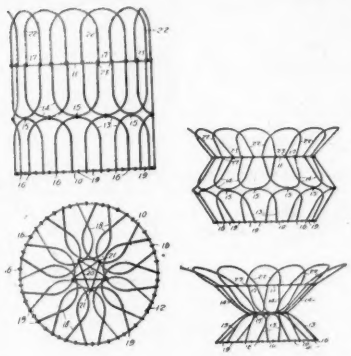
U. S. Patent 1,605,184 issued to C. M. Heddens, Milton, Pa., November 1926.



U. S. Patent 1,600,949, issued to Edward D. Priest, Schenectady, N. Y., assignor to Parker Wire Goods Co., Mass.

Convertible Wire Basket

This basket is made up members so arranged as to be movable with respect to each other,

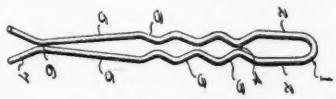


the basket being capable of assuming a variety of shapes, three of them being illustrated above. The base remains the same in all three cases.

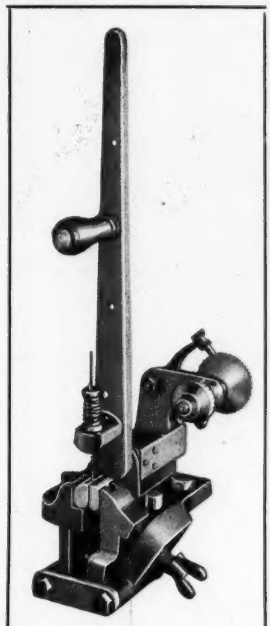
U. S. Patent 1,599,243 issued to C. Parker, Corsicana, Texas, September 1926.

Hair Pin

Not a bad example of the infinite variety of hairpins. Inventors never tire of playing variations on this old theme.



U. S. Patent 1,605,433 issued by C. A. Gibson, assignor to Sta-Rite Hair Pin Co., Inc., both of Shelbyville, Illinois.



Amsler's Wire Ductility Tester

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The best apparatus for investigating the ductility of round and flat wire, ferrous and non-ferrous, is the "Amsler Reversed Bending Tester" illustrated above.

This apparatus gives very valuable information. It can be operated by any intelligent man in the shop and it is inexpensive.

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News of the Industry

(*Continued from page 278*)

THE ATKINSON SPRING CO., Hamburg, N. Y., manufacturer of steel springs, is reported to be contemplating the construction of a new plant at Holly, Mich., to cost about $25,000.

THE Swedish Chamber of Commerce of the United States, 25 Beaver Street, New York, has received an inquiry (Ref. 350) from a company in Sweden in the market for American skid chains for automobiles.

GEORGE Roberts, Jr., of Pittsfield, Massachusetts, has bought through the executors of his father's estate the Thistle Wire Works of Lee. The price is said to have been $75,000. Mr. Roberts will direct the operation of the plant which specializes in the manufacture of wire screens for use in paper mills. (UTPS).

CHARLES K. H. Bunting, since 1918 with Walter B. Snow & Staff, Inc., Boston, technical advertising agent, died suddenly on Nov. 14 as the result of a complication of pneumonia, pleurisy and meningitis. Mr. Bunting, who was born in New York about 45 years ago, was educated at the Massachusetts Institute of Technology and Worcester Polytechnic Institute. He served in the World War with the Canadian infantry from 1914 and with the Royal Flying Corps from 1916, being finally invalided from service in 1918 after being twice severely wounded.

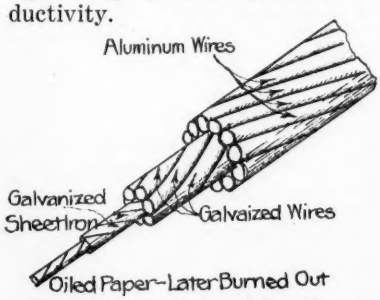
THE Silent Hoist, Winch and Chain Co., Brooklyn, N. Y., has located in its new building at 762-72 Henry St., where more extensive facilities are provided. The Company, formerly located at 302 McDougal Street, is planning a considerable increase in output.

THE Youngstown Sheet and Tube Co. has appointed Glenn W. Christopher manager of bar and wire sales. Mr. Christopher was Pittsburgh district manager of sales of the same firm, for the past three years. Since 1911 he has been in the general sales department of Youngstown Sheet and Tube Co., having for a number of years been associated with the Youngstown and Chicago district offices before assuming charge of sales in Pittsburgh in 1923. He is succeeded in the Pittsburgh office by Arthur Purnell, who has been Boston district sales manager, and he in turn, will be succeeded by F. Egglestone, who formerly was manager of sales in the Atlanta district. These changes become effective December 15.

Method of Making Composite Cables

By N. A. Hall

In electrical work a cable must have high tensile strength and great elasticity as well as conducting power. Most of the metals which are good conductors are of medium or low tensile strength, so more and more composite cables are being used. Iron and aluminum made a common combination of good qualities, the iron furnishing the strength and the aluminum light weight, elasticity and conductivity.



The sketch herewith shows how a German firm produced such a composite cable. A rope of oiled paper was used as the core. This measured 3.5 mm. in diameter and was covered or wound with strips of galvanized sheet iron 7.5 mm. wide, .3 mm. thick, wound on in a right-hand spiral. Six galvanized wires of 3.9 mm. diameter were

"What is the WEAK SPOT in Annealing?"

"Personnel?"

"No!"

"Facilities?"

"No!"

"What, then?"

"OBSOLETE METHODS!"

OBSOLETE methods cost money in the plant that relaxes a constant vigilance.

When a furnace manufacturer relates of saving $2.58 on fuel cost per ton of metal annealed you can make up your mind that there is "Something rotten in Denmark," for this **"saving"** is **four times** as much as the cost should have been.

The cost for fuel per ton of metal annealed should not exceed $.60 (sixty cents). It is, therefore, incompatible with modern methods to effect a **saving** of $2.58. Only by comparison with methods long obsolete could such a **"saving"** be effected.

If you will advise us of the kind and volume of annealing you do, we will show you some facts and figures that will convince you of the merits and economy of the **Bellis Lavite Process** for **Annealing.**

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The ultimate in a compact and inexpensive machine.

One man efficiently operates 6 of these machines simultaneously.

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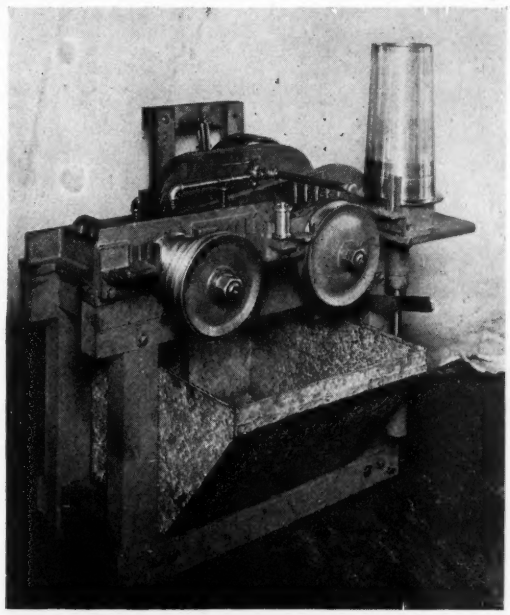

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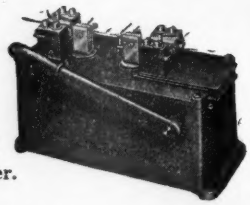
CABLE ADDRESS, ROBECO. 147 RICHMOND AVE.

Standard Electric Wire Pointer



Made in THREE sizes:

No. 1 machine—Capacity up to No. 12 wire.
No. 2 machine—Capacity up to No. 5 wire.
No. 3 machine—Capacity up to ⅝" diameter.
(Wire gauge—W & M standard)

Operates on either 110 or 220 volts, single phase alternating current.
Particularly adapted to shaped wires.

STANDARD MACHINE WORKS

100 Lamartine Street WORCESTER, MASS.

F. KRAUSE DIAMOND DIES

All sizes, immediate deliveries.
Dies for High Speed Wire Drawing Machines guaranteed.

F. KRAUSE & CO., Inc.
Jersey City, N. J.

Phone: Webster 5105 250 OGDEN AVE.

wound on this in the opposite, or left-hand direction. Then for the ouer surface, 12 aluminum wires of 4.1 mm. diameter were wound on as a right-hand spiral.

When the cable was completed, the oiled paper core which was used only because a core is an absolute necessity—for a cable can not be wound without one—was burned out. This left a hollow, spirally wound cable, light, strong, 1.35 times as strong as pure aluminum of the same outside diameter and solid would have been. The sheet iron and galvanized wires give the strength, the aluminum wires conductivity and elasticity. The hollow center and the proportion of aluminum give very light weight in proportion to the size while the method of building up gives great strength.

The Manufacturer's Prayer

John met Jim at lunch today
Sat a while and talked away
"Seemed mighty good," said John of Jim,
"To have a chance to chat with him.
Seems like we don't have half enough
Of hearing other people's stuff.
I live down East, he lives down West
And each thinks he does things the best.
But when we get together—why
It blows the dust out of *my* eye.
I get to thinking I'm all right—
Can beat the others out of sight.
Or else I'm blue and need to know
That sometime others get just so.
Oh why can't we all wiser be
And see the things we need to see
That friendly days-off now and then
Are helpful to the best of men;
That we should seek the chance to go
Where other fellows run their show?
Teach me just this, Oh Lord, I pray—
Not to be satisfied with my way!"

(Connecticut Industry, Oct, 1926)

Wire Firm Merchandises Campaign

(*Continued from page 265*)

being made to industrial buyers, reproduced the covers and text pages of some of the catalogs and data books which were prepared as part of the follow-up material, and detailed the campaigns on special products, including Super Service and Romex, which were being run in addition to the institutional copy.

After the initial distribution of the portfolio, containing the general announcement to the

jobbers, the latter were kept informed of the development of the campaign by folders carrying samples of the inserts which were being run. The comparison between electricity and advertising, referred to by Mr. Dyett in his opening letter, was continued, the folders being captioned, "Keeping the Advertising Current Flowing," "Three More Sales Transformers," etc.

The technical material which was prepared for distribution to engineers and others was especially good. "Transmission Line Handbook" was one which was especially popular. This was in pocket size, bound in leather, and was intended to be used by electrical engineers. It contained charts, tables and other information which would be useful to technical men connected with public utilities.

In the special campaigns, in addition to the publication advertising, some good work was done in informing the jobbers' salesmen of the selling features of the products. For instance, a special booklet was prepared about Romex non-metallic sheathed cable, giving them the complete story of the product, the selling policy, the status of the product from the inspection standpoint, its advantages in installation, etc. This information was especially well received.

The campaign as a whole attracted attention, first, because of its dominating quality, due to the high-class inserts, with their beautiful color reproductions of unusual illustrations, and second, because it was an unusual effort for a manufacturer of this particular kind of material. And the careful way in which the entire campaign was merchandised to the trade gave it a cashable value which made it of maximum, rather than minimum, benefit to the company.

James A. Smith is advertising manager of the company, and Moser & Cotins, Inc., Utica, N. Y., is the agency which produced the campaign.

EST. 1855 AIMCo INC. 1918
"American" INSULATING MACHINERY COMPANY
REG. U.S. PAT. OFF.

TO THE TRADE:
WE WISH A MOST PROSPEROUS AND HAPPY NEW YEAR.

A large wall calendar for 1927 will be mailed upon your early request.

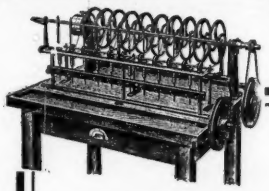
517 Huntington St. PHILADELPHIA PENNSYLVANIA U.S.A.

Wire Drawing Soaps and Compounds
STEELSKIN BRAND
(Registered)

For High or Low Carbon Wire
Working Samples sent on request.

Established 21 years.

R. H. MILLER CO., INC. HOMER, N. Y.



"POHENKRA" WIRE DIE POLISHING MACHINE

Indispensable For All Kinds of Wire-drawing

U. S. Patents
983929—1911
1039186—1912
England 16171
1910
France 420503
Germany 226062
Austria 46339

Gives an absolute guarantee of grinding the diamond holes perfectly round, a result hard to accomplish with all devices employed before.

Simultaneously grinds the entire wall of the draw stone, including the inlet and outlet.

Ten times more effective than previous devices; one workman unassisted can polish 30 diamonds simultanously.

Write For Descriptive Literature

F. KRAUSE & CO., Inc., 250 Ogden Ave., Jersey City, N. J.

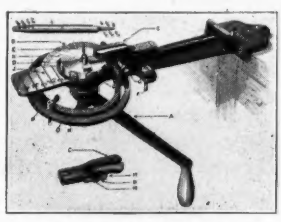
KILMER LITTLE GIANT WIRE FORMER

Forms Eleven Sizes of Eyes from Round, Square, Flat or Half-Round Stock, also almost any shape desired Quickly and Efficiently.

Adjustable for No. 3 to No. 24 Gage Wire.

The cut on the left shows a few of the thousands of the forms made on this FORMER

Price $35.00



Patented April 2, 1918

M. D. Kilmer & Co.

Cleveland, Ohio, U. S. A.
Box 237, Station B.

Vianney Wire Die Works

(American Branch)

Etablissements
Joseph Vianney
Trevoux, France

Manufacturers of
DIAMOND DIES

New York Offices
100 Fifth Avenue
V. J. Boulin, Mgr.

Diamond Dies

Completely made in this Country by latest scientific method.

New way of
re-inforcing the Diamond
R. Kohl, Diamond Die Co.
655 Broad St., Newark, N. J.

The Patented Diamond Die

of proven superiority
through practice and not theory.
The standard of leading wire mills.
Manufactured by:
UNION WIRE DIE CORP.
250 W. 40th St., New York City

Mechanical Testing of Wire

(*Continued from page 261*)

lator, keeping the oil flow constant, independently of the load exerted by the machine. As the pressure increases, B_1 is forced upward, while B_2 is forced downward. B_1 serves to produce the stress in the specimen (at T in tension, and at C in compression), while B_2 serves to measure the loads thus applied.

The inclination lever P, mounted on ball bearings, in vertical position at no load and gradually ascending in proportion to the loads applied, automatically balances and indicates the load during the entire testing operation. The system does not employ knife edges, packings, springs, while the calibration is based solely upon factors which can never undergo any changes (area of measuring piston and dead weight acting upon same). Only one operator is required to perform complete tensile tests on these machines, and unlimited number of testing speeds are available.

The hydraulic testing machine is particularly useful in the higher capacity machines. One type, much used in this country is of 20,000 lbs. capacity. In this outfit, the load producing and load measuring apparatus are mounted separately from the testing machine proper. Two concentric rams are provided in the machine, so that either both rams may work together (producing 20,000 lbs., load), or the inner ram alone may act (producing 2,000 lbs. load). Each of these two major loads is again adjustable on the pendulum lever to a number of smaller load, so that the entire equipment is suitable for the following ranges:

0 to 200 lbs.
0 to 400 lbs.
0 to 1000 lbs.
0 to 2000 lbs.
0 to 4000 lbs.
0 to 100000 lbs.
0 to 20000 lbs.

In the next installment of this article we will show how these tensile machines can be used also for repeated stress ("fatigue") tests of wires and cables, we will describe some of the horizontal cable testing machines designed on the same principle, and we intend to discuss some other mechanical tests of wire and wire products.

Development of Needle Making

(*Continued from page 269*)

them so that all the heads and points are in one direction. In the oldest method the operator wraps a piece of cloth around her finger, spreading a row of needles before her on the bench she brings the cloth up against the end of the needles. Those having their points in that direction will pierce and stick to the cloth so that as she lifts her finger the needles pointed in one direction are removed. The operator thus draws the needles to the right and to the left, bringing all those headed in one direction to one side and those headed in the other direction to the opposite side. The second method of performing this operation is to spread out a row of needles upon a board resting on supports that raise it about one inch above the bench top. A long flat strip is brought against the ends of the needles on one side and expertly pushed forward. As the strip pushes the needles over the edge of the board there is a point at which the heads will overblance the sharpened ends and all the needles headed one way will suddenly upend and fall over the edge with points upward. The operator separates the upended needles from those that lie flat and places them in trays with heads in one direction.

Needles will vary slightly in length although such variation will not be over 5/100 of an inch between any two. Separation is accomplished by spreading the needles in long rows with the heads touching a raised and perfectly straight edge. A rule of soft material brought against

The Waterbury Wire Die Co.

Diamond and Chilled
IRON DIES
DIAMOND TOOLS

Waterbury, Conn.

W. E. Sommerville

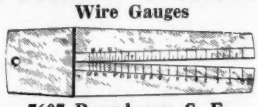
Designers and Manufacturers of highest grade
Stranding Machines—High Speed and Planitary
Spooling and Winding Machines
Closing Machines
Continuous Wire Drawing Machines
Designers of Special Machinery
Coal City, Illinois

Modern Equipment
for
WIRE DRAWING
WIRE INSULATING
WIRE STRANDING

Cabling and Laying up Machines
Complete Equipment for the manufacturing of Conductor Cable and Wire Rope

New England Wire Machinery Co
Designers & Engineers
NEW HAVEN, CONN.

A. WALDECK & COMPANY
Wire Gauges



7607 Broadway, S. E.
CLEVELAND, OHIO

Broden Construction Co.
Wire Mill and Cold Rolling Equipment
10255 Harvard Ave.
CLEVELAND, OHIO

the points of the needles will cause all the longer ones to prick the surface sufficiently so that they may be drawn out by pulling forward the ruler. The process is repeated as many times as it is necessary to separate all of the sizes. In a paper of needles therefore every needle in that particular paper will be the same length but the same number of needle from another paper may be either slightly longer or shorter.

The needles are now ground for the fine point which is accomplished by a machine that passes them rapidly over a small emery stone approximately three inches in diameter and running at a speed of 2,000 r. p. m.

The heads and grooves and countersink of eyes must now be polished. This is done by hand or with simple machines. For the heads wood wheels covered with buff leather are used. For the grooves the needles are brought into contact with wheels studded with small projections like round headed pins. The final polish is done by a machine into which the needles are fed ends first and pass through a series of rollers which not only polish the needles but give them a rotary motion. This final polishing is done very rapidly.

The needles are now picked up from a tray by hand, counted, placed in papers and folded. One girl counts and places in paper, the next girl folds the papers, another girl tucks in the ends. They then go to labelers and packers. Even this work is divided for you will see one boy pasting, another putting the labels on, another marking the number. A different gang of boys then take them and place the papers of needles in trays in a warm oven where they are dried for two hours so as to remove every trace of the moisture from the paste. From the oven the needles are bundled, then boxed and made ready for shipment.

Want Ads

10 cents per word, minimum charge $2.00.
Four insertions at three time rate.

WANTED
Used Machinery
American Insulated Machinery Co.'s
Types
Nos. 1-1½-2-2½-3-4
Braiders
Royal or Housatonic Tubing Machines.
Haskell & Dawes Stranders
Spools and Reels.

Give full particulars in first letter.

Box 114
Wire & Wire Products
471 4th Avenue
New York City

WANTED—A high speed stranding machine. 7 wire construction to strand wire sizes No. 10 to 30. Must be in A1 condition. Box 106. WIRE & WIRE PRODUCTS. 471 4th Ave., New York City.

FOR SALE—Two 61-strand fine wire braiders, A-1 condition. Five 24-carrier steel wire braiders, suitable for metal hose work, or steel braid on insulated wire. Box 107, care WIRE & WIRE PRODUCTS.

SALESMAN WANTED

A man now selling in the wire industry can make good money with this side-line proposition. No samples, easy to sell, and good commission. Write Box 101, WIRE & WIRE PRODUCTS, 471 Fourth Ave.

BUYERS' GUIDE

BAKERS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

BENCHES, WIRE DRAWING
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CRANES
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

DIES, CHILLED IRON
The Waterbury Wire Die Co., Waterbury, Conn.
Master Wire Die Corp.

DIES, DIAMOND
Union Wire Die Corp., New York, N. Y.
F. Krause & Co., Inc., Jersey City, N. J.
Vianney Wire Die orks, New York.
The Waterbury Wire Die Co., Waterbury, Conn.
R. Kohl Co., Newark, N. J.
Diamond Die Co. of America, New York.
Balloffet Diamond Wire Dies Co., Inc., New York.
Cochaud Wire Die Co., New York.

DIES: Repairs & Re-Cutting
F. Krause & Co., Inc., Jersey City, N. J.
John Leather Co., Waterbury, Conn.

EQIUPMENT: Miscellaneous
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
M. A. Irmischer, New York.
Cyrus Currier, Newark, N. J.
Broden Const. Co., Cleveland, Ohio.
General Engineering & Supply Co.

FURNACES, Wire Annealing
Chas. F. Kenworthy, Inc., Waterbury, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Bellis Lavite Co., Branford, Conn.

GAUGES, WIRE
A. Waldeck & Co., Cleveland, Ohio.

LATHES, DIE REAMING
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY, ARMORING (Cable, Wire, Hose)
Sleeper & Hartley, Inc., Worcester, Mass.
J. I. Bernitz, New York.
W. E. Sommerville, Coal City, Ill.

MACHINERY, BALANCING
Herman A. Holz, New York.
Henry L. Scott Co., Providence, R. I.

MACHINERY, BUNDLING
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY, CABLE
W. E. Sommerville, Coal City, Ill.

MACHINERY, CUTTING
Halden Machine Co., Thomaston, Conn.
The F. B. Shuster Co., New Haven, Conn.

MACHINERY, DIE POLISHING
F. Krause & Co., Inc., Jersey City, N. J.
General Engineering & Supply Co.

MACHINERY, COILING
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY, CHAIN FORMING
M. A. Irmischer, New York.

MACHINERY, ELECTRIC CHAIN WELDING
M. A. Irmischer, New York.

MACHINERY, FORMING
M. D. Kilmer & Co., Cleveland, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
M. A. Irmischer, New York.

MACHINERY, GEM CLIP
M. A. Irmischer

MACHINERY, INSULATING
American Insulating Machinery Co., Philadelphia, Pa.

MACHINERY, NAIL
Sleeper & Hartley, Inc., Worcester, Mass.
M. A. Irmischer, New York.

MACHINERY, POINTING
Morgan Construction Co., Worcester, Mass.
Standard Machine Works, Worcester, Mass.
M. A. Irmischer, New York.

MACHINERY, PIN & NEEDLE
M. A. Irmischer, New York.

MACHINERY, SCREW WIRE
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY, SPRING MAKING
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY, STAPLE
Sleeper & Hartley, Inc., Worcester, Mass.
M. A. Irmischer, New York.

MACHINERY, STRAIGHTENING
Halliden Machine Co., Thomaston, Conn.
F. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
M. A. Irmischer, New York.

MACHINERY, STRANDING
Sleeper & Hartley, Inc., Worcester, Mass.
New England Wire Machinery Co., New Haven, Conn.
M. A. Irmischer, New York.
W. E. Sommerville, Coal City, Ill.
Cyrus Currier, Newark, N. J.

MACHINERY, SPOOLING
Cyrus Currier, Newark, N. J.
M. A. Irmischer, New York.
American Insulating Machinery Co., Philadelphia, Pa.
General Engineering & Supply Co.

MACHINERY, PANNING
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MACHINERY, TESTING
Herman A. Holz, New York.
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MACHINERY, WINDING
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY, WIRE DRAWING
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Sleeper & Hartley, Inc., Worcester, Mass.
The Vaughn Machinery Co., Cuyahoga Falls, Ohio.
National Alloyed Metals Co., Providence, R. I.
Superior Tool & Mfg. Co., Worcester, Mass.
W. E. Sommerville, Coal City, Ill.
M. A. Irmischer, New York.
Broden Const. Co., Cleveland, Ohio.
Cyrus Currier, Newark, N. J.
American Insulating Machinery Co., Philadelphia, Pa.
General Engineering & Supply Co.

REELS, TAKE OFF & STRANDING
Attleboro Pressed Steel Corp., Attleboro, Mass.
American Pulley Co., Philadelphia, Pa.
Hubbard Spool Co., Philadelphia, Pa.

REELS, ANNEALING
Mossberg Pressed Steel Corp., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
American Pulley Co., Philadelphia, Pa.

PRESSES, RIVET & BOLT
M. A. Irmischer, New York.

SOAPS, WIRE DRAWING
National Oil Products Co., Harrison, N. J.
R. H. Miller Co., Homer, N. Y.
T. J. Robertson Co., Syracuse, N. Y.

SPOOLS, WIRE & CABLE
Mossberg Pressed Steel Corp., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
American Pulley Co., Philadelphia, Pa.

TOOLS, DIAMOND
F. Krause & Co., Inc., Jersey City, N. J.
The Waterbury Wire Die Co., Waterbury, Conn.

TRUCKS
Morgan Construction Co., Worcester, Mass.

WIRE, IRON & STEEL
Seneca Wires Mfg. Co., Fostoria, Ohio.

WIRE, FINE SILVER, GOLD, ETC.
National Alloyed Metals Co., Providence, R. I.

WIRE WEAVING LOOMS
M. A. Irmischer, New York.

This is a carefully classified index of concerns who specialize in this industry and who advertise regularly in WIRE & WIRE PRODUCTS. Please mention WIRE when writing to these firms.

Are You Interested in Insulation Problems Read "Plastics"

A Monthly Publication devoted to composition materials.

PLASTICS

471 FOURTH AVE., NEW YORK, N. Y.

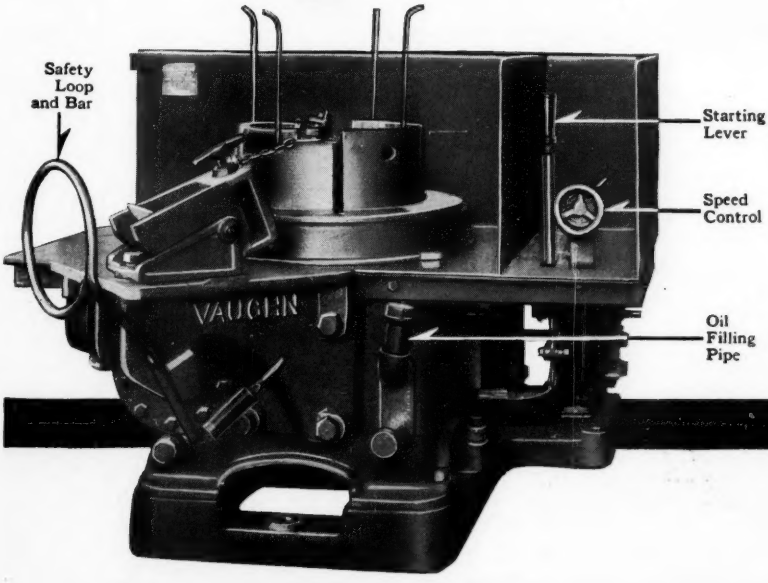
Yearly Subscription $3.00
Foreign Subscription $4.00

Jerkless!

There are no sudden jerks to snap the wire on a MOTOBLOC—acceleration is smooth and even—and yet they give from 100% to 250% higher speeds than the old blocks. Safe, smooth, fast and flexible—the MOTOBLOC is the ideal wire drawing machine.

Vaughn motoblocs

[PATENTS APPLIED FOR]

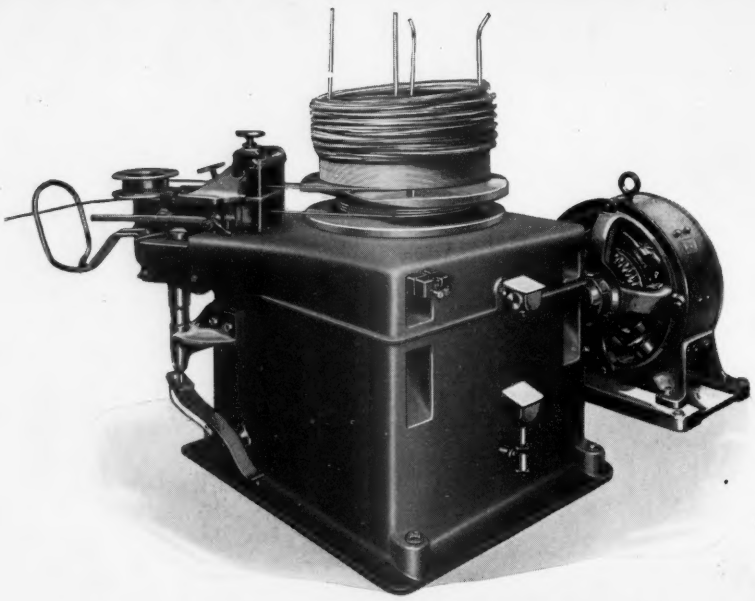


Check these seven reasons why you cannot ignore this important unit:—

1. Adjustable working speeds over a wide range secured through an adjustable speed direct current motor and a simple and rugged control.
2. Very slow starting or pulling—in speed regardless of final working speed.
3. Worm gearing accurately machined and enclosed in an oil tight casing.
4. Ball or roller bearings on main shafts—(optional on motor).
5. One-piece base plate for each unit, supporting main frame, motor and control, all above floor level.
6. Stripper Blocks, designed for use with block strippers and cranes.
7. Positive, easily operated, fool proof electrical safety devices.

The Vaughn Machinery Co.
Cuyahoga Falls, Ohio

MORGAN
WORCESTER
ENGINEERS AND MANUFACTURERS



The Morgan Double Decker

A direct motor connected block for the production of high or low carbon wire in sizes from 8 to 10½ gauge in two simultaneous drafts from #5 rod.

Output per man is increased 40% to 50% and output per spindle and per unit of floor space *is doubled.*

MORGAN CONSTRUCTION CO.
WORCESTER, MASSACHUSETTS, U.S.A.